



DEPARTMENT OF THE NAVY  
NAVAL AIR SYSTEMS COMMAND  
RADM WILLIAM A. MOFFETT BUILDING  
47123 BUSE ROAD, BLDG 2272  
PATUXENT RIVER, MARYLAND 20670-1547

IN REPLY REFER TO

NAVAIRINST 4355.19B  
AIR-3.0/4.0  
25 Jun 03

NAVAIR INSTRUCTION 4355.19B

From: Commander, Naval Air Systems Command

Subj: SYSTEMS ENGINEERING TECHNICAL REVIEW PROCESS

Ref: (a) DoD Directive 5000.1  
(b) DoD Instruction 5000.2  
(c) Interim Defense Acquisition Guidebook  
(d) NAVAIR Systems Engineering Guide  
(e) NAVSO P-3690  
(f) Systems Engineering Technical Review Process Handbook  
(g) NAVAIRINST 3960.2C  
(h) NAVAIRINST 4200.36B

Encl: (1) Essential Systems Engineering Technical Reviews  
(2) Systems Engineering Technical Review Timing

1. Purpose. To establish policy, outline the process, and assign responsibilities for the planning and conduct of Systems Engineering Technical Reviews (SETRs) of Naval Air Systems Command (NAVAIR) programs.

2. Cancellation. This instruction supersedes and cancels NAVAIRINST 4355.19A. Since this is a major revision, changes are not indicated.

3. Scope. This instruction applies to all of NAVAIR Research and Engineering (AIR-4.0) and Logistics (AIR-3.0) personnel supporting NAVAIR and associated Program Executive Officer (PEO) programs involved with the design, development, acquisition, in-service support, and disposal of naval aviation weapon systems and equipment.

4. Discussion

a. References (a) and (b) provide policies and principles applicable to all Department of Defense (DoD) acquisition programs. Among other things, these references require that acquisition programs be managed by application of systems engineering that optimizes total system performance and minimizes total ownership costs. Additionally, cost realism and knowledge-based risk management are mandated. Specifically, knowledge about key aspects of a system shall be demonstrated by the time decisions are to be made. Technology risk shall be reduced and technologies shall have been demonstrated in a relevant environment, with alternatives identified, prior to program initiation. Integration risk shall be reduced and product design demonstrated prior to Design Readiness Review. Manufacturing risk shall be reduced and producibility demonstrated prior to full-rate production. Reference (c) is a guidebook to be

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optionally used for best practices, lessons learned, and expectations. It was formerly DoD 5000.2-R, dated 5 April 2002, and accessible at <http://dod5000.dau.mil/>.

b. SETRs are an integral part of the systems engineering process and life cycle management, and are consistent with existing and emerging commercial/industrial standards. These reviews are not the place for problem solving, but to verify that problem solving has been accomplished. Reference (d) provides systems engineering processes for use in support of the acquisition of NAVAIR systems. As a part of the overall systems engineering process, SETRs enable an independent assessment of emerging designs against plans, processes and key knowledge points in the development process. An integrated team consisting of Integrated Program Team (IPT) members and independent competency subject matter experts conducts these reviews. Engineering rigor, interdisciplinary communications, and competency insight are applied to the maturing design in the assessment of requirements traceability, product metrics, and decision rationale. These SETRs bring to bear additional knowledge to the program design/development process in an effort to ensure program success. Overarching objectives of these reviews are a well-managed engineering effort leading to a satisfactory Technical Evaluation (TECHEVAL) which will meet all of the required technical and programmatic specifications. This in turn will ensure a satisfactory Operational Evaluation (OPEVAL), and the fielding of a suitable and effective system for the warfighter.

c. Reference (a) also requires that Program Managers (PMs) develop and implement performance-based logistics strategies that optimize total system availability while minimizing costs and logistics footprint. Reference (e), Acquisition Logistics for the Rest of Us, dated September 2001, states as fundamental principles that logistics planning is part of the systems engineering process, cannot be accomplished independently, and that reliability and maintainability engineering are cornerstones of a successful logistics program.

d. The SETR process is also the logical setting to review logistics and engineering initiatives. These initiatives include, but are not limited to, the Joint Service Specification Guide (JSSG), the Technical Readiness Assessment (TRA) and the Joint Technical Architecture (JTA). The JSSG is a DoD initiative that provides guidance in the form of tailorable templates utilized in the preparation of aviation performance specifications. TRA is an Office of Naval Research (ONR) initiative, based on National Aeronautics and Space Administration (NASA) technology planning, which consistently assesses the maturity of critical technologies. The JTA is a DoD initiative to assist the achievement of full spectrum dominance and joint military interoperability. Reference (f) provides some guidance with respect to reviewing TRA and JTA initiatives.

## 5. Policy

a. Program, Assistant Program Manager or Systems Engineering (APMSE) and Assistant Program Manager Logistics (APML), as part of the program team, shall ensure that planning for SETRs is fully integrated with the overall program plans for PEO and NAVAIR managed acquisition programs in Acquisition Categories (ACAT) I through IV. Programs already in progress should comply, to the maximum extent possible, within the constraints of the existing budget and contract(s). This SETR planning shall be coordinated with the Program Manager, Air (PMA), the cognizant Assistant Program Executive Officer (APEO) for Research,

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Development, Test and Evaluation (APEO(RDT&E)), and the cognizant APEO for Logistics (APEO(L)). The SETRs should form the technical basis for establishing:

- (1) program definition (cost, schedule, and performance);
- (2) an independent NAVAIR cost estimate of the program; and
- (2) program milestone reviews.

The SETRs may also be applied to Abbreviated Acquisition Programs (AAPs), and other non-ACAT programs as determined and tailored by the cognizant PEO and/or Program/Project Manager. Programs already in progress should comply, to the maximum extent possible, within the constraints of the existing budget and contract(s). Joint and other external organization programs should incorporate these policies, as applicable.

b. SETRs provide the PMA with an integrated technical (e.g. logistics, engineering, T&E, in-service support) recommendation with respect to proceeding to the next technical phase of the program. This is accomplished via a multi-discipline, engineering assessment of the program's progress towards demonstrating and confirming completion of required accomplishments and their exit criteria as defined in program planning. These SETRs include an overall technical assessment of cost, schedule, and performance risk, which forms the basis for an independent NAVAIR cost estimate. End products of these SETRs include risk assessments and mitigation options, Request For Action (RFA) forms, and minutes.

c. Program APMSEs shall ensure naval aviation acquisition programs include a Systems Engineering Management Plan (SEMP) as program documentation, prepared in accordance with reference (d) and approved by the PM. The SEMP should define the overall plan for SETRs and the systems engineering processes to be employed by the program. The following SETRs should be conducted, as applicable, on all ACAT programs:

- (1) Initial Technical Review (ITR);
- (2) Alternative Systems Review (ASR);
- (3) System Requirements Review (SRR);
- (4) System Functional Review (SFR);
- (5) Preliminary Design Review (PDR);
- (6) Critical Design Review (CDR);
- (7) Test Readiness Review (TRR);
- (8) Flight Readiness Review (FRR) (for airborne systems);
- (9) System Verification Review / Production Readiness Review (SVR/PRR);
- (10) Physical Configuration Review (PCR); and

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## (11) Engineering Change Proposal Review (ECPR);

At a minimum, SRRs, PDRs, CDRs and SVRs should be conducted on all non-ACAT acquisition programs.

d. SETRs may be tailored to suit individual program scope and complexity. Tailoring or elimination of reviews should be coordinated with the APEOs for Engineering and Logistics and documented in the Program's SEMP. Programs need not conduct SETRs that do not apply given the structure of the program, i.e. where in the acquisition cycle the program will enter. This tailoring may be updated as part of setting the review agenda and participants, in conjunction with the program APMSE, APML, APEO(RDT&E), and APEO(L). Functional and/or subject matter experts, together with government and contractor IPT membership will participate in these SETRs. Customer representatives are invited to provide the warfighters perspective with a clear linkage to their requirements. Certain reviews may be performed incrementally by configuration item. Enclosure (1) provides a short definition of the objective of each SETR. Additional information concerning implementation of this instruction, and guidelines for compliance are provided separately in the supplemental SETR Process Handbook, reference (f), which contains stand alone technical review modules and a Risk Assessment checklist for each of the reviews. These documents are living documents, intended to be updated based on user experiences, and are accessible in the NAVAIR Microsoft Outlook Public Folders, under Systems Engineering (AIR-4.1G).

e. The cognizant APMSE, with APML assistance, shall ensure that SETRs are conducted in accordance with the Program SEMP and reference (f). The SETRs are structured to assess a program's progress towards demonstrating and confirming completion of required accomplishments and their readiness to proceed to the next key milestone. These reviews should be event driven and conducted when the system's design/development is ready for review. As a product develops, it passes through a series of SETRs of increasing detail. SETRs are structured to ensure that the emerging design/development is ready to enter the next acquisition program phase. Each SETR must have defined entry and exit criteria tied to the required level of design/development maturity and applied across all requirements and technical disciplines. These reviews are confirmation of a process. New issues should not come up at SETRs. If significant new issues do emerge, the review is being held prematurely, with an inherent increase in program risk. Enclosure (2) aligns the chronology of these SETRs in relation to acquisition program events (milestones). The Program SEMP should detail the specific SETR chronology for the program. This is especially important for evolutionary acquisition strategies, using spiral development processes, or multi-component programs.

f. In addition to SETRs, programs conduct Integrated Baseline Reviews (IBRs) and Operational Test Readiness Reviews (OTRRs) in accordance with references (c) and (g) respectively. AIR-4.0 does not normally chair these reviews, but does provide technical elements and support as detailed in the supplemental SETR Process Handbook. The Program SEMP should provide for the technical elements of the IBR and OTRR. Enclosure (2) depicts the SETRs, as well as the IBR and OTRR for completeness.

g. Acquisition program plans and contracts should provide for the conduct of these SETRs as part of the acquisition planning process, in accordance with reference (h). Careful consideration should be given before using individual SETRs as a basis for progress or

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performance-based contract payments. However, payments for successful conduct of SETRs as part of the established award fee criteria may be considered. SETRs are complete when all RFA forms have been addressed, assessed, the status agreed upon, and an updated Risk Assessment as detailed in the SETR Process Handbook, reference (f). Unless specifically provided for in the contract(s), successful completion of SETRs does not affect the requirements, terms, and conditions set forth in the program's contract(s). SETRs should not be used to:

- (1) constitute government approval of the design;
- (2) change the responsibility as set forth in the contract(s);
- (3) change or affect ownership of the design; or
- (4) relieve the contractor from meeting specification requirements as set forth in the contract(s).

h. At any given SETR, the chairperson leads the review. The SETR itself is conducted and approved by the extended IPT (program IPT together with convened subject matter experts and other competency representatives). Systems Engineering Technical Review approval, as it relates to this instruction, is defined as:

- (1) approval of the RFAs generated during the SETR;
- (2) the readiness of the design/development to proceed to the next technical phase of the program; and
- (3) promulgation of the assessment of risk generated during the SETR. Completion of SETRs occurs after all RFA forms have been addressed, assessed, and the status agreed upon.

6. Action. The following responsibilities are assigned relative to the planning, conduct, and reporting of SETRs:

a. AIR-4.1 shall nominate qualified SETR Chairpersons and coordinate the designation of the SETR Chairperson(s) from the appropriate competency. Specific guidance concerning Chairs and Co-chairs is addressed in the supplemental SETR Process Handbook, reference (f). The designated Chairperson, with the assistance of the APMSE and the APML, shall assemble and convene the Technical Review Board (TRB) for the system under review. The TRB analyzes the material presented to develop a technical assessment of the system under review, determine disposition of RFAs in an executive session; and issue minutes of the SETR.

b. Research and Engineering Department Heads (AIR-4.x) shall provide Cost Team (AIR-4.2) representatives and other subject matter experts, as required, to update independent cost and technical assessments as part of each SETR.

c. Program APMSEs, with APML assistance, shall support the PMA:

(1) to ensure program acquisition plans and strategies provide for the conduct of SETRs, and that those reviews are considered in the milestone decision making process. This planning shall be coordinated with the PMA, the cognizant APEO(L), and the cognizant APEO(RDT&E).

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(2) to ensure the program contract(s) Statements of Work (SOWs), Contract Deliverable Requirements Lists (CDRLs), and master schedule include provisions for these identified SETRs, and the required documentation and data to support each review.

(3) to ensure each program has a SEMP, and that SETRs are addressed in that plan, as well as in the contract(s).

d. Program APMSEs, with APML assistance, shall:

(1) ensure the performing activity provides the supporting data and participation in the SETRs;

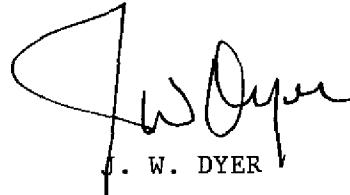
(2) develop, coordinate, and execute, in cooperation with the performing activity, individual SETR arrangements;

(3) ensure the preparation of appropriate material is coordinated across the IPTs;

(4) conduct the SETR; and

(5) organize and supervise the documentation of RFAs in support of the TRB Chairperson.

7. Review. Logistics Management (AIR-3.1) and AIR-4.1 shall coordinate the review of this instruction annually, and implement updates and changes as appropriate.



J. W. DYER

NAVAIRHQs Directive Web Address: <https://directives.navair.navy.mil> or  
<https://wingspan.navair.navy.mil>

### Essential Systems Engineering Technical Reviews

1. Initial Technical Review (ITR). A multi-disciplined technical review to support a program's initial Program Objective Memorandum (POM) submission. This review is intended to ensure that a program's technical baseline is of sufficient rigor to support a valid (acceptable cost risk) cost estimate, and enable an independent NAVAIR assessment of that estimate by cost, technical, and program management subject matter experts.
2. Alternative Systems Review (ASR). A review conducted to demonstrate the preferred system concept(s) to take forward into the Technology Development (TD) (formerly Component Advanced Development (CAD)) phase. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.
3. System Requirements Review (SRR). A system-level review conducted to ensure that system requirements have been completely and properly identified and that there is a mutual understanding between the government and contractor. Captures systems requirements that go with the Concept Refinement (formerly Exploration) and Technology Development phases, and generally conducted just prior to Milestone B. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.
4. System Functional Review (SFR). A review of the conceptual design of the system to establish its capability to satisfy requirements. It establishes the functional baseline as the governing technical description, which is required before proceeding with further technical development. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.
5. Preliminary Design Review (PDR). A review that confirms the preliminary design logically follows the SFR findings, and meets the requirements. It normally includes heavy emphasis on software specifications, and results in approval to begin detailed design. Establishes the allocated baseline. Also validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.
6. Critical Design Review (CDR). A review conducted to evaluate the completeness of the design, its interfaces, and its suitability to start initial manufacturing. Establishes the product baseline. Also validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.
7. Test Readiness Review (TRR). A review of the systems/programs readiness to begin testing at any level, by either the contractor or government. Determines the completeness of test procedures, and their compliance with test plans and descriptions.
8. Flight Readiness Review (FRR). A review to ensure the proper people, planning, equipment, materials, training, configuration, flight clearance (or defined flight clearance process, with plans to get an initial flight clearance at FRR), ranges, instrumentation, safety controls, and risk assessments/mitigations are in place prior to flight.

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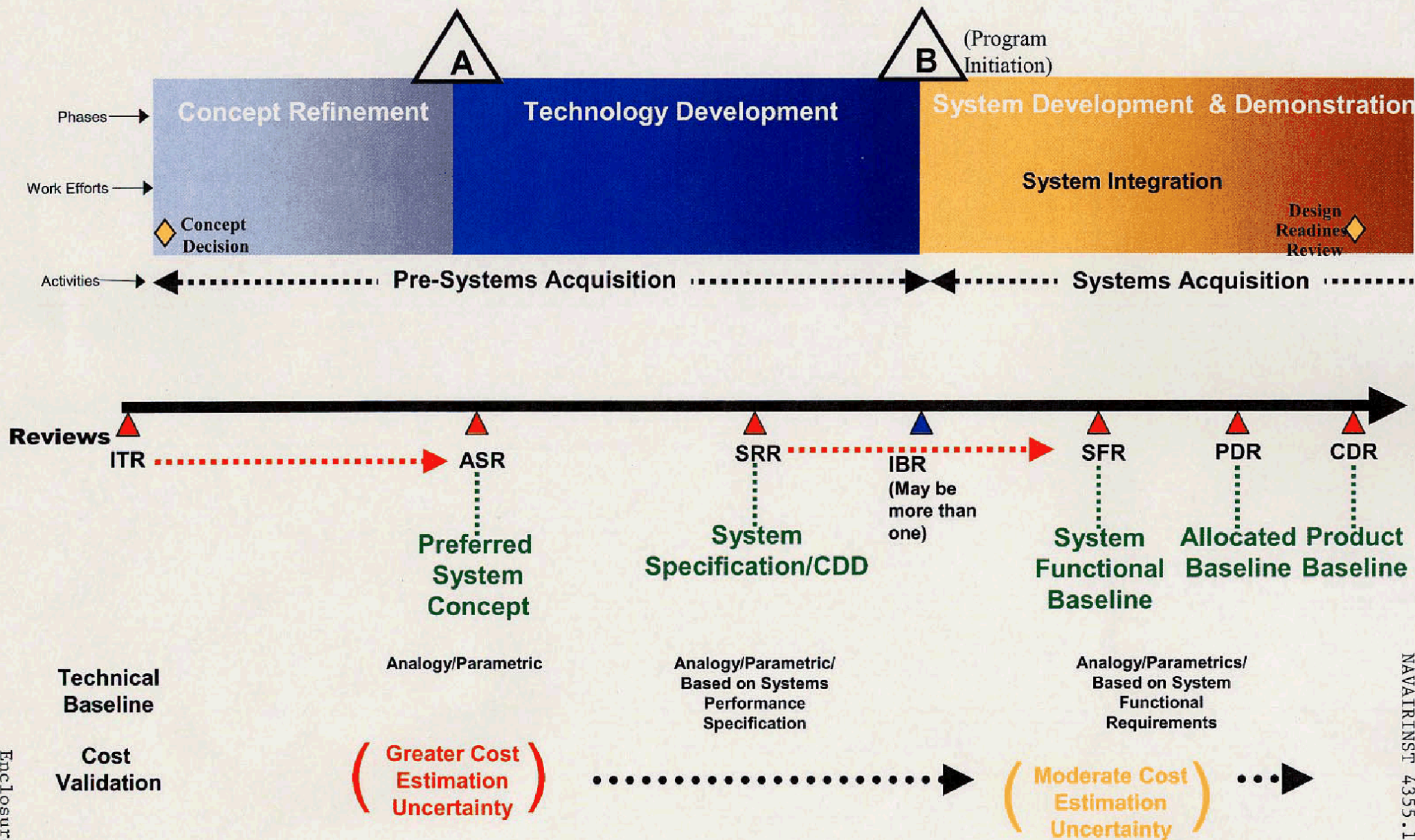
9. System Verification Review/Production Readiness Review (SVR/PRR). SVR is a review conducted to verify that the actual item (which represents the production configuration) complies with the performance specification. PRR is a review conducted incrementally prior to any rate production decision to validate design readiness, resolution of production engineering problems, and accomplishment of production phase planning. Validates program cost, schedule, and performance for the purpose of supporting Milestone approvals.

10. Physical Configuration Review (PCR). A SETR that verifies the product baseline as reflected in the early production configuration item. The PCR formalizes the product baseline, including specifications and the Technical Data Package (TDP), so that future changes can only be made through full Configuration Management (CM) procedures.

11. Engineering Change Proposal Review (ECPR). A SETR of proposed engineering changes to the fielded system.



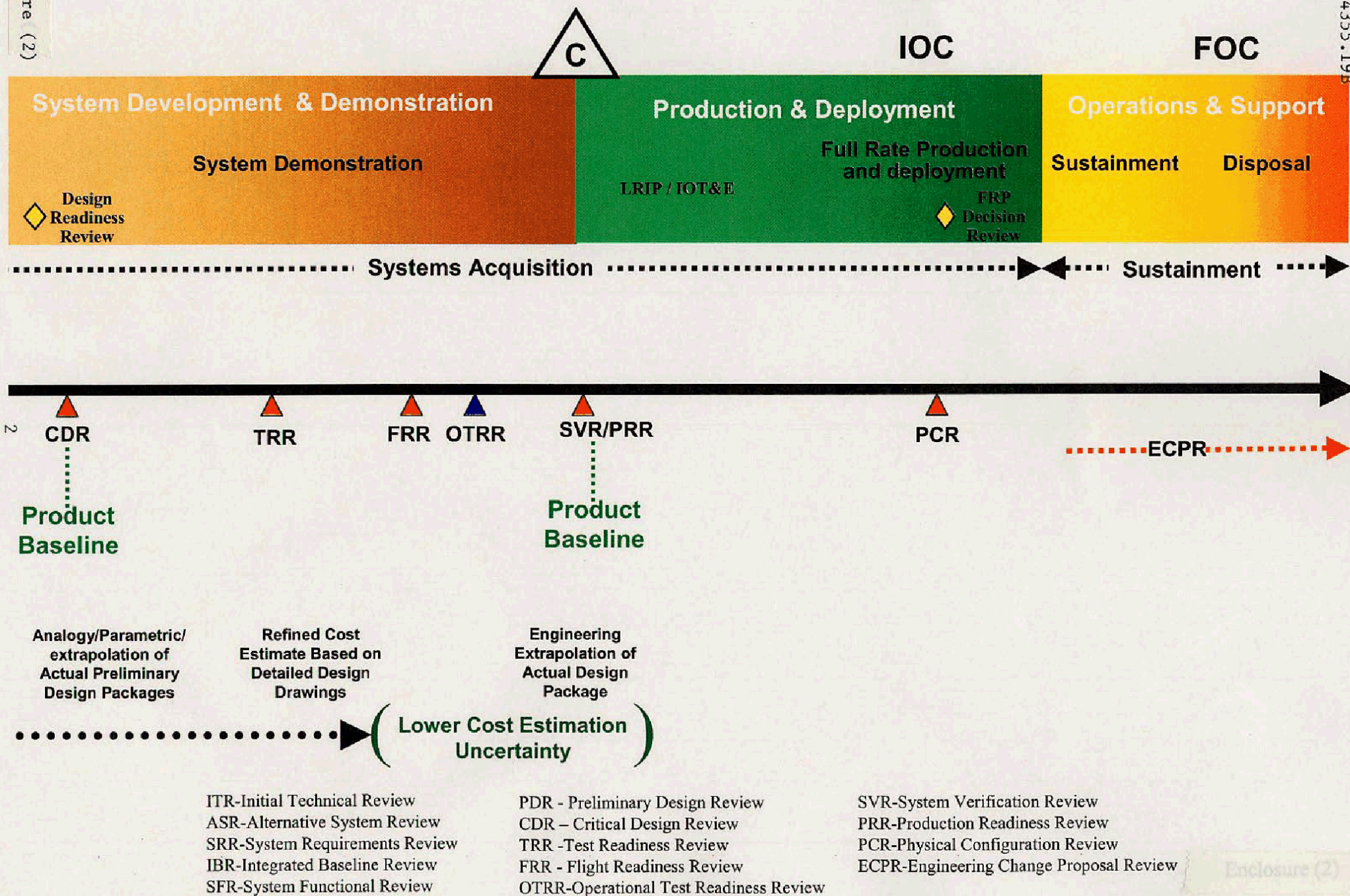
# Systems Engineering





# Technical Review Timing

Enclosure (2)



Enclosure (2)